ZOOLOGY.—*A new Floridan* Pectiniunguis, *with re-appraisal of its type species and comments on the status of* Adenoschendyla *and* Litoschendyla (*Chilopoda: Geophilomorpha: Schendylidae*). R. E. Crabill, Jr., U.S. National Museum, Smithsonian Institution.

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In 1889, the year of his untimely death, Charles Harvey Bollman proposed a new genus, *Pectiniunguis*, for the reception of two species, one of which had been collected at Pichilinque Bay,[1] near La Paz, at the southern end of Baja California; he called his new centipede *Pectiniunguis americanus* and declared this species to be the type of the genus. This was only the second generic name referable to a group subsequently to be recognized as a family and called Schendylidae.

The Bollman species was reported for the second time in 1889 when O. F. Cook collected what he took to be *americanus* on the Florida Keys; subsequent workers until the present time have accepted the validity of his identification. It was, however, in error, as a recent comparison of the rediscovered Bollman type with the Cook material reveals. Final confirmation was possible following the study of a series of fresh specimens generously donated to the U.S. National Museum by Dr. H. V. Weems, Jr., of Gainesville, Fla. These specimens constitute the typical series of the new species described below.

Pectiniunguis (as it is defined here) may be distinguished from other schendyline genera by its possession of the following characters: Each coxopleuron has two gland pits of the heterogenous type; sternital porefields present; second maxillary claw bipectinate, the coxosternites not fused posterolaterally and posteriorly with the postmaxillary sclerites; ultimate pretarsus is either absent or minutely tuberculate. In 1912 Broelemann and Ribaut in a splendid monograph employed the same diagnostic features and added their own discovery that specimens so characterized display two kinds of labra. Some of the species, including *americanus,* they believed, have medial labral undulations instead of true alveolate, rooted and discrete teeth. They ascribed the possession of true medial teeth to other species to which they assigned (1911) a new generic name, *Adenoschendyla; geayi* is the type species (by subsequent monotypy).

Following an extended discussion (1912, p. 69), they summarized the differences between the two labral types as follows: "Arc médian à ondulations superficielles, appuyé à des pièces latérales peu dévelopées en avant . . ." for *Pectiniunguis*; versus "Arc médian composé de dents tuberculeuses presque individualisées et munies d'une racine appuyé à des pièces latérales plus or moins distinct de la zone prélabiale . . ." for some others including *Adenoschendyla.* In 1923 Professor Chamberlin, in the belief that *americanus* has true medial labral teeth, showed that *Adenoschendyla* must fall as the junior synonym of *Pectiniunguis* and that this action would leave the species with midlabral undulations without a generic name. For them he proposed a new name, *Litoschendyla,* designating *insulanus* (Broelemann and Ribaut) as its type species. In his monograph of 1929 Attems accepted the Chamberlin resolution, and the matter was apparently closed. The case seems simple and convincing; however, the recent examination of Bollman's type and of the six types of the present new species provides a basis for doubt which is implicit in two questions. (1) Since the *only* intergeneric character is said to be the labral one described by the French workers and accepted by Chamberlin and Attems, is it really significant and, if so, practical; that is, does it represent an intergroup repeatable difference *in kind* as the French authorities maintained (and if so will it assist rather than confuse the generic assignment of species), or, on the other hand, does this character represent a difference *in degree* which is quite variable among closely similar species and even intraspecifically (and if so

[1] The type locality was originally given as "Pichiliungue Bay," a misspelling for Pichilinque Bay.

would its use weaken the function of the genus as a collective category)? (2) And in case the labral character is really significant intergenerically, then to which of the two labral types is *Pectiniunguis americanus* assignable, for the resolution of this question determines the zoological content and the nomenclatural disposition of all three generic names.

It cannot be denied that in some species, e.g., *geayi*, there are some, or is at least one, specimen with relatively long, discrete medial teeth, and that in other species the medial teeth are blunter, lower, wholly or partly fused with each other, e.g., *insulanus*, *halirrhytus*, n. sp. On the other hand, two factors cannot be avoided, interpretative subjectivity and inter- or intraspecific variability. The labrum is normally directed ventroposteriorly, so that looking down upon it one sees it at an angle and not in perfect, flat outline; consequently the interdental fissures can appear shorter than they are, or absent when they are present, or they may not even be recognized as fissures. Therefore one person might decide that the teeth are labral undulations that are connected with each other or continuous; another, seeing the same specimen but under different conditions of preparation and magnification, could report quite a conflicting impression. The character, then, is capable of being interpreted in quite a highly subjective manner. Secondly, in my series of *halirrhytus* I have observed considerable labral variability, ranging from a typically "undulate" condition to one in which the medial structures seem typically toothlike, being discrete and apparently rooted. Yet five of the six specimens were collected at the same time from the same pile of seaweed, and all agree most minutely in other significant respects. I suggest that the labral difference, at least in some species and conceivably in many or in all, is one of degree, not of kind; that is, in some species (A) the teeth are long and tend to be or are well separated (e.g., *geayi*), whereas in some others (B) the teeth are shorter, blunter and are discrete or quite variously fused (e.g. *insulanus*, *halirrhytus*). Given a suitable series of any species, considerable variability *within* each of these two categories, A and B, might reasonably be anticipated. It seems most significant to me that, guided by the Broelemann-Ribaut criteria as applied to *halirrhytus*, one could, *if he had only one specimen at his disposal and not a series*, assign the holotype to *Litoschendyla*, some paratypes to *Pectiniunguis* and feel quite uncertain of the allocation of some others. If it is really the case that this labral character is a concomitant of supraspecific, e.g. generic, grouping, then either it is not now sufficiently refined, or else no degree of refinement can make of it a reliable indicator of supraspecific affinities. The reasonable solution seems provisionally to be to unite both kinds of species within one genus, defining the labral characters rather broadly and characterizing them as involving midlabral teeth that are either (A) low, blunt, nodular, separated or variously fused; or (B) longer, more or less well defined, essentially or clearly discrete. This is not to suggest that two monophyletic groups, genera let us say, are not actually involved, only that if they are, existing criteria seem inadequate for distinguishing them in a satisfactory manner. For practical purposes of preliminary classification it seems best for the time being to include all under the senior generic name.

The second question concerns the affinity of *americanus*, the type species of *Pectiniunguis*. Without any question its midlabral area is much more like that of *insulanus* and *halirrhytus* than that of *geayi*. Its midlabral teeth are low, rather nodular, some have interdental fissures but some do not (Fig. 5). The very distinct fissures separating the most central teeth from those adjacent seem to be artifacts owing their existence to the fact that the greatly arched labrum was crushed perfectly flat in the preparation of the microscopic slide by Cook or Collins. Therefore the present opinion is that careful scrutiny at high magnifications (450 ×) favors the original arrangement of Broelemann and Ribaut, so that if future studies provide new support for a division of *Pectiniunguis* into two genera, like that of 1912, one would be *Pectiniunguis* Bollman, 1889, type species *americanus*

Bollman, 1889 (teeth nodular, short, variously fused); the other, *Adenoschendyla* Broelemann and Ribaut, 1911, type species *geayi* Broelemann and Ribaut, 1911 (teeth longer, more or less discrete, typically dentiform rather than nodular): *Litoschendyla* Chamberlin, 1923, type species *insulana* (Broelemann and Ribaut), 1911 (teeth nodular or undulate, interdental fissures obscure or absent), would then fall as a junior subjective synonym of *Pectiniunguis*.

Pectiniunguis halirrhytus, n. sp.

On the basis of the limited evidence in the literature and the direct evidence derived from study of the type of *americanus*, it seems probable that the new species is most like the Brazilian *geayi* (Broelemann and Ribaut), the Colombian *chazaliei* (Broelemann), the Cuban *insulanus* (Broelemann and Ribaut), the Guianan *gaigei* (Chamberlin), and the Lower Californian *americanus* Bollman. In all, the leg-pair range is roughly similar, and the sternital porefields are undivided and extend in an unbroken series to one of the latter body segments.

In both *geayi* and *gaigei* the basal prehensorial article bears a tiny denticle, the porefields are subcircular or circular on all sternites, the midlabral teeth are, at least in the types, relatively long, narrow and apparently typically dentiform; at least *geayi* lacks a clypeal area: in *halirrhytus* no prehensorial article has any denticle whatever, the porefields are transversely elliptical to subtriangular becoming subcircular only on the rear sternites, the midlabral teeth are in some specimens typically dentiform but in others crenulate or undulate, in all they are nodular, short and broad. Like the new species, *insulanus* and *chazaliei* have short, broad midlabral teeth, but in both there are four mandibular dentate blocks, whereas in *halirrhytus* there are consistently only three. Moreover, in *chazaliei* the clypeus is not separated from the buccae by (paraclypeal) sutures, but in *halirrhytus* these sutures are prominent and complete, so that clypeus and buccae are separated; in *insulanus* the porefields are absent on the last four sternites, but in *halirrhytus* there is a tiny poregroup on the penult sternite.

Perhaps Bollman's *americanus* is most like *halirrhytus*; though the two are quite similar in many respects, they also differ rather strikingly in certain characters. In *americanus*: there is prominent subsurface dark pigmentation manifestating itself dorsally as a geminate longitudinal band, ventrally and laterally as dark blotches; the pretarsal accessory claws are equal in length and are not more than half as long as the claw proper which is robust, rather blunt and only slightly curved; the legs' femora and tibiae ventrally are only sparsely setose and are not more setose than the other articles; the ultimate sternite is relatively broader and shorter; the ultimate pretarsus is small but evidently discrete and distinctly tuberculate. In *halirrhytus*: there is in the typical series[2] no dark subsurface pigmentation whatever; the pretarsal accessory claws differ markedly in length, the larger of the two being more than three-fourths the length of the claw proper which is quite thin, well curved and pointed apically; the legs' femora and tibiae ventrally are clothed very densely with fine setae but the other articles are not; the ultimate is relatively longer and narrower; the ultimate pretarsus is intimately fused with the tarsus (or else it is absent) but in any case is not discrete and typically tuberculate. It seems unlikely that there are pleural differences too. The Cook and Collins representation of the pleural region of *americanus* (their Fig. 3) shows 4 gamma to be absent, but a re-examination of the Bollman type shows that it is present, just as it is in *halirrhytus*.

Holotype:—female. Florida: Monroe County, Big Pine Key; in beach seaweed; December 30, 1957, H. V. Weems, Jr., leg. In U.S. National Museum Myriapod Collection, no. 2548.

Introductory. Total length, ca. 49 mm. Pedal segments, 59. Body shape: anterior quarter of body slightly attenuate, posterior third more conspicuously so. Color: head antennae and prehensorial segment pale orange-yellow; tergites,

[2] In 1899 Cook reported that some of his Florida Key specimens of what he called *Pectiniunguis americanus* had dorsal dark geminate bands. Having re-examined his material, I find that apart from the specimens of *halirrhytus*, all pale in color, there are at least two other species, the banded *Polycricus marginalis* (Meinert), and another species of *Pectiniunguis* which is weakly banded but whose identity is quite questionable owing to the extremely poor condition of the material. These specimens seem rather like the true *americanus*; however their present state of preservation precludes a confident assignment to that or any other species.

pleurites paler yellow; legs and sternites varying from very dilute yellow to white; body entirely without subsurface dark bands or blotches of pigmented cells.

Antennae. Length (in Hoyer's mountant), 4.9 mm. Shape: distally very slightly attenuate; each article but the first slightly longer than wide. Setae (dorsal aspect): first 4–5 articles with few short setae, each with 2 circlets of long setae; articles 5 or 6 through 14 each densely finely setose. Special sensilla: fourteenth article with an elongate patch of spatulate setae on outer distal half (these absent on medial surface); a dorsal patch of short stiff special setae on articles 14, 9, 5, (2?). Cephalic Plate (Fig. 12). Length, 1.3 mm; greatest width, 1.2 mm. Shape: dorsal surface inflated or domed, not flat; anterior margin essentially rounded; sides very slightly incurved and distinctly convergent posteriorly; posterior margin straight. Setae very few, these moderately long. Areolation: coarse and deep on anterior dorsal lateral third, approximately the dorsal and lateral two-thirds smoothly shallowly areolate. Frontal suture entirely absent; with two essentially parallel paramedian sulci passing from posterior margin of plate forward for about half its length. Prebasal plate exposed for its entire width, very narrowly laterally, widely at middle. Clypeus. Paraclypeal sutures conspicuous, wide, complete from antennal sockets to outer edge of each labral fultura (Kommandibulares Gerüst). Surface swollen ventrally especially in region of labrum. Each bucca (pleuron of some authors) glabrous, well defined, with a prominent transbuccal suture running perpendicular to long head axis at level of fultura. Clypeus anterocentrally with a large, well-defined but essentially elongate ovate to flask-shaped clypeal area, this identified by its smaller, much paler areolate figures between which minute glandular pores open (seen only at 450 ×). Without areas of consolidate areolation (plagulae). Setae: postantennals, 2; posterior geminate setae (just anterior to labrum), 2, minute; midclypeals rather robust, 9 on each side, in two poorly defined transverse rows on anterior quarter of clypeus, the two medialmost setae occupying the aforementioned clypeal area. Clypeus adjacent to labrum swollen, the areolation here heavier, darker. Labrum (Fig. 7). *In situ* its free margin is strongly directed posteroventrally, the lateral ends bulging laterally, cleft, heavily sclerotized. Central arc separated from clypeus by a narrow membranous suture, with 4 low, irregular, blunt, nodular teeth, some of these not distinctly separated from each other, vaguely anchored to clypeus, the 4 nodular teeth flanked on each side by one weakly pointed tooth. Lateral part of labrum on each side indistinctly separated from central arc but fused without suture to adjacent clypeus and continuous with it, each side of labrum with about 7 teeth, each tooth firmly anchored, broad, essentially separated from the one adjacent, each with a relatively long and very sharp medially directed extension. Mandible (Fig. 1). Dentate lamella in 3 distinct, heavily sclerotized blocks, dentition 2-3-3, the innermost block (*in situ*, ventralmost) partly overlapped by the row of simple hyaline teeth, these numbering some 23, each sharply pointed. First Maxillae (Fig. 10). Coxosternum coarsely areolate, without medial sulcus or suture; setae as shown. Coxosternal lappets thick, short, mostly concealed, reaching level of base of second telopodite article; areolate, not fibrous or squamulate. Medial lobes subtriangular, without apical nipples, distal half membranous. Telopodite biarticulate, broad, apical rounded; lappets concealed, thick, curved, areolate, not fibrous or squamulate, not exceeding end of telopodite. Second Maxillae (Figs. 6, 10). The coxosternites very broadly joined by an isthmus, this medially narrowly continuous with 1st maxillary coxosternum. Postmaxillary sclerites (pleura of some authors) separated from posterior outer corners of maxillae by a broad membranous suture on each side; inner corner not reaching metameric pore opening, outer part not surpassing level of aforementioned suture. Telopodite: 1st article basally with a ventral and a dorsal condyle, inner and outer margins essentially parallel; third article much longer than second; apical claw robust, very long, distally strongly attenuate and apically incurved, with a dorsal and a ventral comb of long thin flat hyaline teeth. Prosternum (Fig. 11). Anteriorly broadly diastemate, not denticulate; entirely without midlongitudinal sulcus. Pleura very broad; pleuroprosternal suture strongly oblique, the adjacent prosternal margin thickened as shown; sclerotic lines absent. Setae few and moderate in length. Anterolateral corners smoothly areolate, the remainder coarsely deeply so. Prehensorial Telopodite (Fig. 11). When closed, not exceeding front margin of

head. 1st article rather short and broad, without a denticle; second and third articles without denticles; tarsungula basally with a typical denticle but with a broad pale fold somewhat resembling a denticle; claw relatively long and curved, neither its dorsal nor ventral edges serrulate. Poison calyx extremely long and thin, the lower end abruptly deflected laterally; poison gland long and pointed, terminating posteriorly near base of trochanteroprefemur.

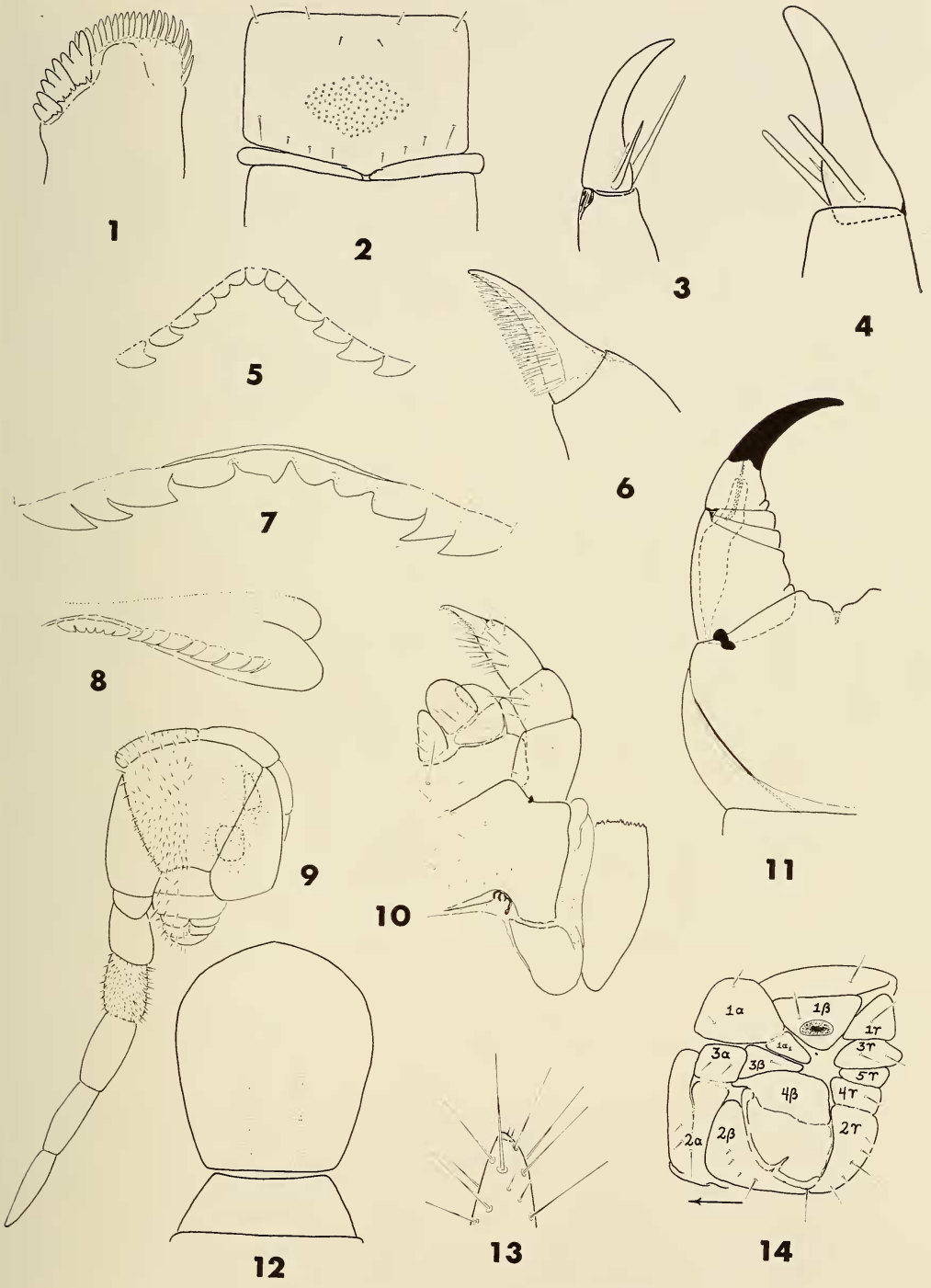
Tergites. Basal plate centrally neither foveate nor sulcate; peripherally darker yellow, the areolation smoother, centrally whiter, the areolation coarser and deeper. Remaining pedal tergites (except the ultimate) each shallowly but distinctly bisulcate, sparsely setose. Pleurites (Fig. 14). Coarsely areolate, very sparsely setose. All spiracles strongly elliptical, their axes horizontal. Series 1, 2, and 3 complete; 1 alpha is divided; 4 alpha evidently not discrete (i.e., not present); 4 gamma and 5 gamma are present, conspicuous. Legs (except ultimate) (Fig. 3). Ventral vestiture: femora and tibiae of legs 3 through penults very densely, finely setose; setae of remaining articles long and notably fewer in number. Posteriorly the legs become progressively thinner and longer. Pretarsi very thin (compressed side-to-side), distally strongly curved and apically sharply pointed; anterior accessory claw very long, at least three-fourths as long as claw proper, posterior accessory claw conspicuously shorter than the anterior, both accessory claws robust and pointed. Sternites (Fig. 2). Porefields absent on the first but present on pedal sternites 2 through penultimate; last two porefields minute, each consisting of a few pores; porefields all undivided, those of anterior body third subelliptical to subtriangular, becoming wider side-to-side and developing rather pointed lateral ends, on posterior body third becoming rounder and smaller. Ventropleural subcoxal sclerites without porefields. Sternites of anterior one-third to one-half of body each with a very shallow transverse depression.

Ultimate Pedal Segment (Figs. 9, 13). Pretergite concealing anterior portion of coxapleuron; broadly fused with its pleurites, laterally not suturate. Tergite much broader at midlength than long; sides essentially straight and strongly convergent posteriorly; rear margin truncate. Presternite distinctly sulcate medially. Sternite width at midlength about equal to greatest exposed length; sides essentially straight, rear margin broadly evenly excavate; whole surface considerably swollen; rather densely clothed with short stiff setae, especially posteriorly, as shown. Coxopleuron as seen above exposed posterolaterally; the whole structure slightly swollen; posterior ventral half densely setose, the anterior lateral and dorsal parts with many fewer setae; each coxopleuron with 2 large ventral, concealed glandular pits, each pit with a large concealed exit and internally with numerous inclusive canals and glands (heterogenous type). Ultimate leg with 6 articles distal to coxopleuron; tarsus biarticulate, the articles thin and long; pretarsus either absent or so intimately fused with tarsus as to be indistinguishable; femur and tibia slightly flattened dorsally and moderately swollen ventrally; all articles dorsally with moderate vestiture but trochanter, prefemur, femur and tibia ventrally very densely finely setose, setae of tarsi long and less numerous.

Postpedal Segments (Fig. 9). Gonopods uniarticulate, flat, wide, medially contiguous. Terminal pores absent.

Allotype:—male. See collection data for holotype. The male allotype agrees closely with the holotype but differs significantly as follows.

Figs. 1–14.—Holotype (HT) and paratype (PT) of *halirrhytus* and holotype (HT) of *americanus*: 1, *halirrhytus* (HT): mandible. 2, *halirrhytus* (HT): sixth pedal sternite. All setae shown. 3, *halirrhytus* (HT): representative pretarsus from anterior third of body. 4, *americanus* (HT): representative pretarsus from anterior third of body. 5, *americanus* (HT): central portion of labrum. Ventral aspect. 6, *halirrhytus* (HT): left claw of second maxillae. 7, *halirrhytus* (HT): central portion of labrum. Ventral aspect. 8, *hallirrhytus* (PT): left half of labrum. Ventral aspect. 9, *halirrhytus* (HT): ultimate pedal segment and postpedal segments. Ventral. Setae shown only on right presternite, sternite, postpedal segments, and femur. Hidden glands and gland pits shown in dashed lines. 10, *halirrhytus* (HT): first and second maxillae with postmaxillary sclerite and adjacent cephalic plate; left side. All setae of maxillae shown. 11, *halirrhytus* (HT): right prehensor and right side of prosternum; ventral aspect. Setae deleted. Poison calyx and poison gland outlined in dashes within prehensor. 12, *halirrhytus* (HT): cephalic, prebasal, and basal plates. Cephalic paramedian sulci shown in stipples. Setae and antennae deleted. 13, *halirrhytus* (HT): tip of second tarsal article of ultimate leg. 14, *halirrhytus* (HT): left pleural region of tenth pedal segment. All setae shown.



Figs. 1–14.—(See opposite page for legend).

Length, 49 mm. Pedal segments, 55. Clypeus: midclypeal setae 9 + 10; posterior geminate setae absent. Labrum: medial arc wider, with 8–9 nodular undulate teeth, the interdental fissures between some absent, between others very vague, the suture separating the central arc from clypeus proportionately longer; lateral teeth about 5 on each side. Ultimate pedal segment: all leg articles conspicuously swollen ventrally and laterally, the prefemur, femur and tibia markedly flattened dorsally; all articles very densely finely clothed ventrally with stiff setae. Postpedal segments: gonopods biarticulare, long, projecting well beyond rear of body, basally widely separated.

The following paratypes differ from the holotype in the significant characters cited:

Paratype A: female. See collection data for holotype. Length, 62 mm. Pedal segments, 57. Prebasal plate very broadly exposed. Midclypeal setae right 12, left 7; posterior geminate setae present, minute. Labrum: central arc with 7–9 blunt, low broad teeth, these sharply separated from each other by deep, narrow interdental fissures; each lateral part with 8–10 broad, weakly pointed teeth. Mandibular dentate blocks 3, dentition 2-3-3.

Paratype B: male. See collection data for holotype. Length, 52 mm. Pedal segments, 57. Prebasal plate very narrowly exposed. Midclypeal setae right 7, left 7; only one minute posterior geminate seta present. Labrum: central arc with 8–10 blunt low teeth, these with short, narrow but distinct interdental fissures; each lateral labral part with about 8 teeth, some with long apical points, some lacking them. Mandibular dentate blocks 3, dentition 3-3-3. Coxopleural pits fully exposed, not concealed.

Paratype C: female. See collection data for holotype. Length, 42 mm. Pedal segments, 55. Prebasal plate very narrowly exposed, nearly concealed. Midclypeal setae 9 + 9; only one posterior geminate seta present and this seems vestigial. Labrum: 8 teeth on central arc, these with shallow interdental fissures, blunt, low, broad; lateral teeth about 7 on each side. Mandibular dentate blocks, 3, dentition 2-3-3 (left), 3-3-3 (right).

Paratype D:—female. Florida: Monroe County, Flamingo; May 3, 1958; R. S. Swanson and C. F. Dowling, leg. Length, 64 mm. Pedal segments, 57. Prebasal plate well exposed. Midclypeal setae right 11, left 9; with two minute posterior geminate setae. Labrum: central arc with 4–5 blunt broad teeth, the interdental fissures very shallow or else absent (Fig. 8); lateral teeth strongly pointed, 9–10 on each side. Mandibular dentate blocks 3, dentition 2-3-3.

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The beliefs which we have most warrant for, have no safeguard to rest on, but a standing invitation to the whole world to prove them unfounded. If the challenge is not accepted, or is accepted and the attempt fails, we are far enough from certainty still; but we have done the best that the existing state of human reason admits of; we have neglected nothing that could give the truth the chance of reaching us: if the lists are kept open, we may hope that if there be a better truth, it will be found when the human mind is capable of receiving it; and in the meantime we may rely on having attained such approach to truth, as is possible in our day. This is the amount of certainty attainable by a fallible being, and this is the sole way of attaining it.—John Stuart Mill.